CLAIMS

1. A method of forming a layer of fixed geometry for use in a device having at least two device layers, the method comprising the steps of:

providing a substrate for the device; and

depositing a precursor in a substantially liquid form on a top surface of the substrate to form at least one layer of fixed geometry.

2. The method of forming a layer of fixed geometry as set forth in claim 1, wherein said step of depositing a precursor comprises the substep of flow-fill depositing a sol-gel precursor.

3. The method of forming a layer of fixed geometry as set forth in claim 2, wherein the precursor in said step of depositing is silicon dioxide (SiO_2).

4. The method of forming a layer of fixed geometry as set forth in claim 3, wherein the flow-fill depositing substep is performed using a wet film obtained as a byproduct in the reaction of tetraethyloxysilicate (TEOS) with H_20.

5. The method of forming a layer of fixed geometry as set forth in claim 4, wherein the reaction in said flow-fill depositing substep is a reaction of TEOS with H_20 and O_2, N_2O, O_3, H_2O_2.

6. The method of forming a layer of fixed geometry as set forth in claim 3, wherein the flow-fill depositing substep is performed using a growth of SiO_2 obtained from a mixture of SiH_4 + H_2O_2 and H_2O.

7. The method of forming a layer of fixed geometry as set forth in claim 6, wherein the mixture in said flow-fill depositing substep is a mixture of SiH_4 + H_2O_2, O_2, N_2O, O_3, and H_2O.

8. The method of forming a layer of fixed geometry as set forth in claim 1, wherein the device is a flat panel display composed of a cathode and a faceplate;

wherein the faceplate is composed of the substrate provided in said providing step and a conductive layer; and

wherein the at least one layer of fixed geometry is formed as at least one spacer on the faceplate of the flat panel display for maintaining a distance between the cathode and the faceplate in the flat panel display.

9. The method of forming a layer of fixed geometry as set forth in claim 8, wherein said depositing step further comprises the substep of forming a plurality of spacers uniformly deposited on the substrate.

10. The method of forming a layer of fixed geometry as set forth in claim 8, wherein said depositing step further comprises the substep of forming at least one spacer having a circular cross-sectional shape normal to a top surface of the substrate.

11. The method of forming a layer of fixed geometry as set forth in claim 8, wherein said depositing step further comprises the substep of forming at least one spacer having an approximately I-shaped spacer.

12. The method of forming a layer of fixed geometry as set forth in claim 8, wherein said depositing step further comprises the substep of forming at least one spacer having an approximately T-shaped spacer.

13. A method of fabricating a flat panel display having a cathode and a faceplate, the method comprising the steps of:

depositing a first layer of photoresist on the faceplate;

depositing a patterned second layer of photoresist on the first layer of photoresist, the second layer covering selected portions of the first layer of photoresist;

providing a light source to expose the second layer of photoresist and portions of the first layer of photoresist not covered by the second layer of photoresist so as to form openings in the first layer that expose portions of the faceplate;

flow-fill depositing a wet film of sol-gel precursor made of silicon dioxide (SiO_2) on a top surface of the first layer of photoresist and in the openings in the first layer;

baking the precursor so as to form spacers in the form of SiO_2-filled columns in the openings in the first layer of photoresist;

planarizing the precursor to remove the precursor on the first layer of photoresist while leaving the precursor filled in the openings in the first layer;

stripping the first layer of photoresist leaving the SiO_2-filled columns as spacers on the faceplate; and

assembling the flat panel display with the cathode and the faceplate separated by the spacers.

14. The method of fabricating a flat panel display as recited in claim 13, wherein said flow-fill depositing step is performed using a wet film in the form of a liquid obtained as a byproduct in the reaction of tetraethyloxysilicate (TEOS) with H_2O.

15. The method of fabricating a flat panel display as recited in claim 14, wherein the reaction in said flow-fill depositing substep is a reaction of TEOS with H_20 and O_2, N_2O, O_3, H_2O_2.

16. The method of fabricating a flat panel display as recited in claim 13, wherein said flow-fill depositing step is performed using a growth of SiO_2 obtained from a mixture of SiH_4 + H_2O_2 and H_2O.

17. The method of fabricating a flat panel display as recited in claim 16, wherein the flow-fill depositing substep is performed using a growth of SiO_2 obtained from a mixture of SiH_4 + H_2O_2, O_2, N_2O, O_3, and H_2O.

18. The method of fabricating a flat panel display as recited in claim 13, wherein said flow-fill depositing step further comprises the substep of providing separated reactive gas trains, one bearing silane (SiH_4) and the other bearing hydrogen peroxide (H_2O_2), which are then mixed to form the silicon dioxide ($Si(OH_4)$) precursor.

19. The method of fabricating a flat panel display as recited in claim 18, wherein one of the reactive gas trains bears is bearing hydrogen peroxide (H_2O_2), N_2O, O_2, H_2O, O_3.

20. The method of fabricating a flat panel display as recited in claim 13, wherein said flow-fill depositing step further comprises the substep of providing glass-like material in the form of doped SiO_2.

21. The method of fabricating a flat panel display as recited in claim 13, wherein an oxide capping layer is applied to the spacers on the faceplate using plasma enhanced chemical vapor deposition (PECVD) after said flow-filling depositing step is performed.

22. The method of fabricating a flat panel display as recited in claim 13, further comprising the step of expulsion of quantities of water from the spacers in accordance with the following reaction:

$$H[OSi(OH_2)]_nOH \rightarrow nSiO_2 + (n+1)H_2O.$$

23. The method of fabricating a flat panel display as recited in claim 13, wherein the faceplate is prepared by depositing an underlayer using plasma enhanced chemical vapor deposition (PECVD) prior to said flow-filling depositing step.

24. The method of fabricating a flat panel display as recited in claim 22, wherein the faceplate is prepared by depositing an underlayer using plasma enhanced chemical vapor deposition (PECVD) prior to said flow-filling depositing step.

25. The method of fabricating a flat panel display as recited in claim 13, wherein the said assembling step further comprises the substep of vacuum sealing the flat panel display.

26. The method of fabricating a flat panel display as recited in claim 13, wherein the spacers are X-shaped.

27. A multi-layer device comprising:

a first device layer;

a second device layer; and

at least one flow-fill structure in the form of a spacer providing a minimum distance between said first and second device layers.

28. The multi-layer device as recited in claim 27, wherein said at least one spacer is one of a plurality of homogenous amorphous spacers provided at uniform distances from each other throughout the multi-layer device.

29. The multi-layer device as recited in claim 28, wherein the plurality of spacers have different heights.

30. The multi-layer device as recited in claim 29, wherein spacers in a center position in the multi-layer device are higher than spacers at side positions of the multi-layer device.

31. The multi-layer device as recited in claim 27, wherein said at least one spacer is shaped as a rod positioned substantially normal to a top surface plane of said second device layer.

32. The multi-layer device as recited in claim 27, wherein said at least one spacer has an approximately I-shaped structure.

33. The multi-layer device as recited in claim 27, wherein said at least one spacer has an approximately T-shaped structure.

34. The multi-layer device as recited in claim 33, wherein a wider end portion of the approximately T-shaped structure of said at least one spacer is coupled to said second device layer.

35. The multi-layer device as recited in claim 33, wherein a wider end portion of the T-shape structure of said at least one spacer is coupled to said first device layer.

36. The multi-layer device as recited in claim 27, wherein the device is a flat panel display, where said second device layer is a faceplate substrate having a conductive layer formed thereon, and wherein said at least one spacer is formed directly on the faceplate substrate.

37. A processor system comprising:

a processor; and

a flat panel display, wherein said flat panel display comprises:

a cathode;

an anode; and

at least one homogenous amorphous flow-fill deposited spacer providing a minimum distance between said cathode and said anode.

38. The flat panel display as recited in claim 37, wherein said at least one spacer is one of a plurality of homogenous amorphous spacers provided at uniform distances from each other throughout the flat panel display.

39. The flat panel display as recited in claim 38, wherein the plurality of spacers have different heights.

40. The flat panel display as recited in claim 39, wherein spacers in a center position in the flat panel display are higher than spacers at side positions of the flat panel display.

41. The flat panel display as recited in claim 37, wherein said at least one spacer is shaped as a rod positioned substantially normal to a top surface plane of said anode.

42. The flat panel display as recited in claim 37, wherein said at least one spacer has an approximately I-shaped structure.

43. The flat panel display as recited in claim 37, wherein said at least one spacer has an approximately T-shaped structure.

44. The flat panel display as recited in claim 43, wherein a wider end portion of the approximately T-shaped structure of said at least one spacer is coupled to said anode.

45. The flat panel display as recited in claim 43, wherein a wider end portion of the T-shape structure of said at least one spacer is coupled to said cathode.

46. The flat panel display as recited in claim 37, wherein said anode is a faceplate substrate having a conductive layer formed thereon, and wherein said at least one spacer is formed directly on the faceplate substrate.